

Attorney's Docket No.: 06666-060001

Amendment to the Claims:

This listing of claims replaces all prior versions of claims:

1. (Currently Amended) A system for estimating inputs and outputs of a digital transmission system, comprising:

a receiver front-end configured to receive an ~~observed~~ digital signal in the digital transmission system as an observed digital signal;

a forward recursion element adapted to receive the observed digital signal, and generate a first sequence of soft information by performing a forward recursion;

at least one forward channel estimator adapted to receive the observed digital signal and said first sequence of soft information, said at least one forward channel estimator operating to estimate forward channel parameters using said first sequence of soft information;

a backward recursion element adapted to receive the observed digital signal, and generate a second sequence of soft information by performing a backward recursion;

at least one backward channel estimator adapted to receive the observed digital signal and said second sequence of soft information, said at least one backward channel estimator operating to estimate backward channel parameters using said second sequence of soft information; and

a combiner configured to compute a transitional information that ~~that~~ binds the forward channel parameter estimates with the ~~backward channel parameter estimates of said first and second sequences of soft information together~~, said combiner operating to generate soft information ~~on the inputs and outputs of the digital transmission system by combining updated~~ said first and second sequences of soft information and said transitional information.

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2. (Original) The system of claim 1, wherein said forward recursion element is a Trellis-based forward operator, and said backward recursion element is a Trellis-based backward operator, where each operator generates a sequence of Trellis state soft information updates.

3. (Original) The system of claim 2, wherein each of said Trellis-based forward operator and backward operator is a min/sum operator.

4. (Original) The system of claim 3, wherein each of said min/sum operators performs min/sum operations on said sequence of Trellis state soft information updates.

5. (Currently Amended) The system of claim 4, wherein each of said min/sum operators computes soft output for the inputs and outputs defined by Trellis state transition.

6. (Currently Amended) The system of claim 5, wherein said soft ~~output~~ outputs for the inputs and outputs defined by Trellis state transition [[is]] are computed [[as]] by min/sum operations of a starting state forward soft information, said Trellis state transition, an ending state backward soft information, and a binding factor.

7. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a sum/product operator.

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8. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a min/product operator.

9. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a max/product operator.

10. (Original) The system of claim 2, wherein each of said Trellis-based forward operator and backward operator is a min*/sum operator.

11. (Currently Amended) The system of claim 2, wherein each of said forward and backward operators includes [[a]] at least one Kalman filter channel estimator ~~for each Trellis state~~.

12. (Currently Amended) The system of claim 2, wherein each of said forward and backward operators includes [[a]] at least one least mean-square estimator ~~for each Trellis state~~.

13. (Currently Amended) The system of claim 2, wherein each of said forward and backward operators includes [[a]] at least one non-linear estimator ~~for each Trellis state~~.

14. (Currently Amended) The system of claim 13, wherein said at least one non-linear estimator is a phase-locked loop.

15. (Currently Amended) The system of claim 2, wherein each of said forward and backward operators includes [[an]] at least one open-loop estimator ~~for each Trellis state~~.

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16. (Currently Amended) A method for estimating inputs and outputs of a digital transmission system, comprising:

receiving ~~an observed~~ digital signal in the digital transmission system as an observed digital signal;

generating a first sequence of soft information by performing a forward recursion;

estimating forward channel parameters using said first sequence of soft information and said observed digital signal;

generating a second sequence of soft information by performing a backward recursion;

estimating backward channel parameters using said second sequence of soft information and said observed digital signal;

computing a transitional information that ~~[[ties]]~~ binds the forward channel parameter estimates with the ~~[[and]]~~ backward channel parameter estimates of said first and second sequences of soft information together; and

generating soft information ~~on the inputs and outputs~~ of the digital transmission system by combining said updated first and second sequences of soft information and said transitional information.

17. (Currently Amended) An iterative receiver system, comprising:

a channel processor configured to receive a plurality of coded symbols, said channel processor operating to produce and update soft information on said plurality of coded symbols, where said channel processor is activated by ~~[[updated]]~~ soft information, updated by other soft-input/soft-output modules, on interleaved code symbols and wherein said channel processor operating to produce and update soft information comprises:

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generating a first sequence of soft information
by performing a forward recursion,

estimating forward channel parameters using said
first sequence of soft information and said plurality
of coded symbols,

generating a second sequence of soft information
by performing a backward recursion,

estimating backward channel parameters using said
second sequence of soft information and said plurality
of coded symbols,

computing a transitional information that
[[ties]] binds the forward channel parameter estimates
with the [[and]] backward channel parameter estimates
~~of said first and second sequences of soft information~~
~~together,~~ and

generating ~~said~~ soft information on said
plurality of coded symbols ~~and outputs of said channel~~
~~processor~~ by combining updated said first and second
sequences of soft information and said transitional
information;

a soft-in/soft-out decoder configured to receive said
soft-information on said plurality of coded symbols, said soft-
in/soft-out decoder operating to compute soft information on
said plurality of coded symbols; and

an interleaver/de-interleaver pair operating to pass
said soft information to/from said channel processor from/to
said soft-in/soft-out decoder,

where after several iterations, final bit decisions
are made on uncoded bits by said soft-in/soft-out decoder by
thresholding the corresponding soft information produced by said
soft-in/soft-out decoder.

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18. (New) The system of claim 1; wherein said combiner configured to compute a transitional information that ties said first and second sequences of soft information together comprises said combiner configured to compute a transitional information that ties said first and second sequences of soft information and forward and backward channel estimates together.

19. (New) The system of claim 1, wherein said combiner operating to generate soft information of the digital transmission system comprises said combiner operating to generate soft information on the inputs and outputs of the digital transmission system.